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International Construction Measurement Standard

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ICMS Coalition (www.icms-coalition.org)

International Construction Measurement Standard

Global Consistency in Presenting Construction Costs

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Contents

Welcome to ICMS: Global Consistency in Presenting Construction Costs

ICMS aims to provide global consistency in classifying, defining, analysing and presenting construction costs at a project, regional, state, national or international level.

This project is the first of its kind, bringing together numerous organisations from around the world to create shared international standards for presenting construction costs. This first edition of **ICMS** focuses on capital costs; however, future editions of **ICMS** may incorporate other matters such as costs in use.

Consistent practice in presenting construction costs globally would bring significant benefits to construction cost management. Globalisation of the construction business has increased the need to make meaningful comparative analysis between countries, not least by international organisations such as the World Bank Group, the International Monetary Fund, various regional development banks, non-governmental organisations and the United Nations.

The **Coalition** did not identify any existing standard that was suitable for international adoption. For this reason, the **Coalition** has come together to create shared standards. At a meeting at the International Monetary Fund in June 2015, **Coalition** members confirmed they were committed to promoting the implementation of **ICMS** to encourage world markets to accept and adopt **ICMS** as the primary standard for presenting construction costs across different nations in a consistent way.

An independent Standard Setting Committee (the **SSC**) was formed. The **SSC** includes technical experts from 11 countries and a combined expertise covering 47 different markets. The **SSC** worked virtually and also met three times, once in Brussels and twice in London.

A wide range of professional organisations are represented in the **Coalition** and the **SSC**. They were generous in providing their national standards, which provided the basis for the early deliberations of the **SSC**.

The **SSC** produced the complete consultation draft of **ICMS** within a year, in July 2016. Following the private consultation period in October 2016, two public consultations took place between November 2016 and April 2017. The completed first edition was published in July 2017.

The **Coalition** accepts that standard setting is a continuous and dynamic process; it will be listening closely to the global construction cost management community to ensure necessary updates are captured for continued improvement. In addition to preparing further editions of **ICMS** for additional categories of civil engineering projects, the **SSC** will also monitor all guidance notes on **ICMS** to ensure that they are consistent with the principles and intent of **ICMS**. All local, regional or worldwide approaches will be documented to allow coordination, expansion and consistency of **ICMS** guidance whenever required.

The **Coalition** is beginning the important work of implementation by liaising with governments on a national, regional or state and local level to seek adoption of **ICMS**. Many key stakeholders are being engaged in the process of implementation. A list of **ICMS**-supporting partners is shown on the **ICMS Coalition** website (www.icms-coalition.org) – these organisations are committed to the adoption of **ICMS**.

The **Coalition**, the **SSC** and the numerous participants in the consultation are proud to present **ICMS**.

For further information on **ICMS** please visit the website (www.icms-coalition.org).

On behalf of the **ICMS Coalition Trustees**:

Ken Creighton – (Royal Institution of Chartered Surveyors) - Chair
Martin Darley – (Association for the Advancement of Cost Engineering) - Vice Chair
Julie Dela Cruz – (Philippine Institute of Certified Quantity Surveyors) – General Secretary
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Introduction

The International Construction Measurement Standard Coalition (the **Coalition**) was formed on 17 June 2015 after meeting at the International Monetary Fund in Washington DC, USA. The **Coalition**, comprising the organisations listed below at the date of publication, aims to bring about consistency in construction cost reporting standards internationally. This is achieved by the creation and adoption of this **ICMS**, an agreed international standard for the structuring and presentation of cost reports. **ICMS** sets out a structure for describing construction costs in terms of project scope, attributes and values descriptors.

This document setting out the provisions of **ICMS** is the first prepared by the **Coalition**'s Standard Setting Committee (the **SSC**). The **Coalition** members at the date of publication are:

Africa Association of Quantity Surveyors (AAQS)
Association for the Advancement of Cost Engineering International (AACE)
Association of Cost Engineers (ACostE)
Association of South African Quantity Surveyors (ASAQS)
Australian Institute of Quantity Surveyors (AIQS)
Brazilian Institute of Cost Engineers (IBEC)
Building Surveyors Institute of Japan (BSIJ)
Canadian Institute of Quantity Surveyors (CIQS)
Chartered Institute of Building (CIOB)
Chartered Institution of Civil Engineering Surveyors (ICES)
China Electricity Council (CEC)
China Engineering Cost Association (CECA)
Commonwealth Association of Surveying and Land Economy (CASLE)
Conseil Europeen des Economistes de la Construction (CEEC)
Consejo General de la Arquitectura Técnica de España (CGATE)
Dutch Association of Quantity Surveyors (NVBK)
European Federation of Engineering Consultancy Associations (EFCA)
Federation Internationale des Geometres (FIG)
Ghana Institution of Surveyors (GhIS)
Hong Kong Institute of Surveyors (HKIS)
Ikatan Quantity Surveyor Indonesia (IQSI)
Indian Institute of Quantity Surveyors (IIQS)
Institute of Engineering and Technology (IET)
Institute of Quantity Surveyors of Kenya (IQSK)
Institution of Civil Engineers (ICE)
Institution of Surveyors Kenya (ISK)
International Cost Engineering Council (ICEC)
Italian Association for Total Cost Management (AICE)
Korean Institution of Quantity Surveyors (KIQS)
New Zealand Institute of Quantity Surveyors (NZIQS)
Nigerian Institute of Quantity Surveyors (NIQS)
Pacific Association of Quantity Surveyors (PAQS)
Philippine Institute of Certified Quantity Surveyors (PICQS)
Property Institute of New Zealand (PINZ)
Real Estate Institute of Botswana (REIB)
Royal Institute of British Architects (RIBA)
Royal Institution of Chartered Surveyors (RICS)
Royal Institution of Surveyors Malaysia (RISM)
Singapore Institute of Building Limited (SIBL)
Singapore Institute of Surveyors and Valuers (SISV)
Sociedad Mexicana de Ingeniería Económica, Financiera y de Costos
Society of Chartered Surveyors Ireland (SCSI)
Union Nationale des Economistes de la Construction (UNTEC)

Construction organisations have been working internationally for many years. Research has shown, however, that different approaches to presenting the costs of construction can vary by as much as

25–30% due to inconsistent methodology and standards. Hence international standards are required to ensure global consistency in presenting the costs of construction projects.

The aim of the **Coalition** is to provide a structure and format for classifying, defining, analysing and presenting construction costs that will provide consistency and transparency across international boundaries. The **SSC** has focused only on issues directly related to the costs of construction so that cross-boundary costs can be benchmarked and the causes of differences in costs can be identified.

The **ICMS** project followed work on the development of International Property Measurement Standards (**IPMS**). **IPMS** established standards for measuring the floor areas of buildings. For **ICMS** a key element agreed by the **Coalition** members was that **ICMS** would be compatible and would accord with **IPMS**.

This Standard offers a framework of 13 **Project Categories**, each identifying a different type of construction **Project** and a template against which costs can be classified, recorded, analysed and presented. The hierarchical framework has four levels:

- Level 1: Project Category
- Level 2: Cost Category
- Level 3: Cost Group
- Level 4: Cost Subgroup.

The composition of Levels 2 and 3 is the same for all **Project Categories**. Although discretion is allowed in the contents of Level 4, the recommended contents of Level 4 are given in Appendices A, B and C.

This Standard provides definitions, scope, attributes and values, units of measurement and explanatory notes for each **Project Category**. It provides guidance on:

- how the Standard is to be used
- the level of detail to be included
- the method of dealing with projects combining different **Project Categories**; and
- the approach to be taken to ensure that like is compared with like, especially taking account different currencies and time frames.

For buildings, the various cost analysis standards worldwide require the measurement of a gross floor area either external gross external floor area (GEFA) or internal gross internal floor area (GIFA). This permits the representation of overall costs in terms of currency per GEFA or GIFA. Research shows that floor area measurement standards vary considerably between countries. The linking of **ICMS** with **IPMS** provides a valuable tool for overcoming these inconsistencies. **ICMS** requires a cost report to include both GEFA (**IPMS 1**) and GIFA (**IPMS 2**) measured in accordance with the rules set out in **IPMS**. These are summarised in Appendix F.

For civil engineering projects, **ICMS** also provides units of measurement describing their sizes and functional capacities for the purpose of comparison.

The **SSC** prioritised setting a measurement standard for buildings and selected categories of civil engineering projects. The civil engineering categories chosen for this first edition of **ICMS** are those that are most commonly required and cover:

- transport
- energy
- oil and gas and
- the utility sectors.

Further categories will be added in future editions.

ICMS has been created through a transparent, detailed and inclusive standard-setting process by the **SSC**. Members of the **SSC** brought to share their expertise and knowledge of practices in their own countries as well as a broader understanding informed by their international experience. In addition, they drew upon the guidance of international correspondents. This resulted in a full analysis and

appreciation of the standards and practices in many more countries than those directly represented by **SSC** members. **ICMS** is not a hybrid of those standards but does introduce some concepts that may be new to some markets.

ICMS is a high-level standard. Markets that do not have established standards are encouraged to adopt **ICMS**. Markets that do have established local standards should adopt **ICMS** to compare cost data prepared using different standards from different markets on a consistent, like-for-like basis. The aim of the **SSC** is not to replace existing local standards, but to provide a consistent framework into which data generated locally can be allocated for the purposes of comparison. In time it is expected that **ICMS** will become the primary basis for both global and local construction cost reporting.

ICMS Standard Setting Committee

In June 2015, the **Coalition** selected construction cost management experts from around the world to form its Standard Setting Committee (the **SSC**) and develop a global standard for presenting construction costs.

The **SSC** comprises experts representing a wide range of construction professional organisations.

The **SSC** acts independently from the **Coalition** and its members.

The **SSC** members and co-authors of this Standard are:

Ong See-Lian (Malaysia)	Chairman
Alan Muse (UK)	Vice - Chairman
Gerard O'Sullivan (Republic of Ireland)	Executive Secretary
Alexander Aronsohn (UK)	
Dainna Baharuddin (Malaysia)	
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David Picken (Australia)	
Anil Sawhney (India)	
Peter Schwanethal (UK)	
Koji Tanaka (Japan)	
Tang Ki-Cheung (Hong Kong)	

Part 1 Context

1.1 Introduction

The aim of **ICMS** is to provide global consistency in classifying, defining, analysing and presenting construction costs at a project, regional, state, national or international level. **ICMS** allows:

- construction costs to be consistently and transparently benchmarked
- the causes of differences in costs between projects to be identified
- properly informed decisions on the design and location of construction projects to be made and
- data to be used with confidence for construction project financing and investment, decision-making, and related purposes.

This part provides definitions of terms commonly used throughout the Standard. Definitions specific to particular types of projects are provided in Appendices A, B and C. This part also sets out the aim and use of the Standard.

1.2 Definitions

Associated Capital Costs

The costs associated with project realisation, from inception to putting the **Project** into use, and which are not part of the **Capital Construction Costs**.

Capital Construction Costs

Expenditure on labour, materials, plant, equipment, site and head office overheads and profit, plus taxes incurred as a direct result of the construction intervention. It is the total price payable for work normally included in contracts to construct a building or civil engineering works, including any supplies by the **Client** for the **Constructor** to fix. **Capital Construction Costs** also include all temporary works required to undertake the construction works.

Client

The entity that procures or provides site, commissions and pays **Service Providers** and **Constructors** to design and construct a **Project** on the site including, in some cases, funding, operating and maintaining the **Project,** and pays all other **Associated Capital Costs**.

Coalition

The International Construction Measurement Standard Coalition, comprising not-for-profit organisations, each with a public interest mandate.

Constructor

Organisation commissioned and paid by a **Client** to construct a **Project** or part thereof including, in some cases, providing funding, design, maintenance and operation services.

Cost Category

A division of costs under the **Project Category** into **Capital Construction Costs** and **Associated Capital Costs** currently, with further divisions for Costs in Use (see bibliography) in the future editions of the Standard.

Cost Group

A division of costs under a **Cost Category** into a small number of broad groups to enable easy estimation or extraction of cost data for quick high-level comparison by design disciplines or common purposes.

Cost Management Professional

A **Service Provider** competent to calculate, interpret, analyse, apportion and report on **ICMS**.

Cost Subgroup

A division of costs under a given **Cost Group** according to their functions or common purposes irrespective of their design, specification, materials or construction to enable the costs of alternatives serving the same function or common purpose to be compared, evaluated and selected.

ICMS

International Construction Measurement Standard.

IPMS

International Property Measurement Standards. **IPMS** is the global standard that aims to enhance the transparency and consistency in the way **Property** is measured across markets. It was developed by the **IPMS Coalition**, an independent group of professional bodies from around the world.

Price Level Adjustment

An allowance for the increases or decreases in the price levels, due to inflation or deflation respectively, over a defined period.

Project

A built asset or group of built assets with a single purpose or common purposes commissioned by a **Client,** or group of **Clients,** with a defined start and end date. A **Projec**t may comprise a number of **Project Categories.**

Project Attributes

The principal characteristics of a **Project** relating to time, cost, scope of works, design, quality, quantity, procurement, location and other contextual features that might impact its cost (see Schedule 1).

Project Category

Classification of a **Project** based on the United Nations International Standard Industrial Classification (**United Nations ISIC**) structure of economic activities.

Project Complexity

The relative intricacy of a **Project** by reference to its form, design, method, site constraints or timing of construction.

Project Quantities

The dimensional quantities (physical sizes: areas, lengths, volumes) and functional quantities (capacities, inputs, outputs) required to be captured in the **Project Attributes** and **Project Values** such that the costs of different projects or design schemes can be converted to a unit cost per the desired **Project Quantity** for evaluation and comparison. Both are required for each **Project Category**.

Project Values

A standard set of descriptions and/or measurements for each of the **Project Attributes**.

Property

Any real estate asset in the built environment.

Risk Allowance

Risk is an uncertain event or circumstance that, if it occurs, will affect the outcome of a **Project**. A **Risk Allowance** is a quantitative allowance set aside as a precaution against future needs, to allow for uncertainty of outcome.

Service Provider

Any organisation or individual providing construction advice, or a service, to a **Client** including, but not limited to, project managers, architects, engineers, technical architects or engineers, surveyors, **Cost Management Professionals**, constructors, facilities managers, planners, valuers, property managers, asset managers, agents and brokers.

Taxes and Levies

Mandatory costs levied by national governments, states, municipalities or governmental organisations on the net construction costs and which are directly attributable to the **Project** undertaken, whether paid by the **Client** or the **Constructor**.

Total Capital Cost

The total of **Capital Construction Costs** and **Associated Capital Costs** for either the **Project** or a **Project Category.**

Total Project Cost

The sum of the costs of all **Project Categories** within a single **Project.**

United Nations ISIC

The United Nations International Standard Industrial Classification of All Economic Activities (**ISIC**) consisting of a coherent and consistent classification structure of economic activities based on a set of internationally agreed concepts, definitions, principles and classification rules.

1.3 Use of the Standard

ICMS can be used for any purpose agreed between **Clients** and **Service Providers**.

ICMS can be used to analyse and compare historic, present and future costs of new and retrofit/refurbishment projects. Applications include, but are not limited to:

- global investment decisions
- international, national, regional or state cost comparisons
- feasibility studies and development appraisals
- project work including cost planning and control, cost analysis, cost modelling and the procurement and analysis of tenders
- dispute resolution work
- reinstatement costs for the purpose of insurance and
- valuation of assets and liabilities.

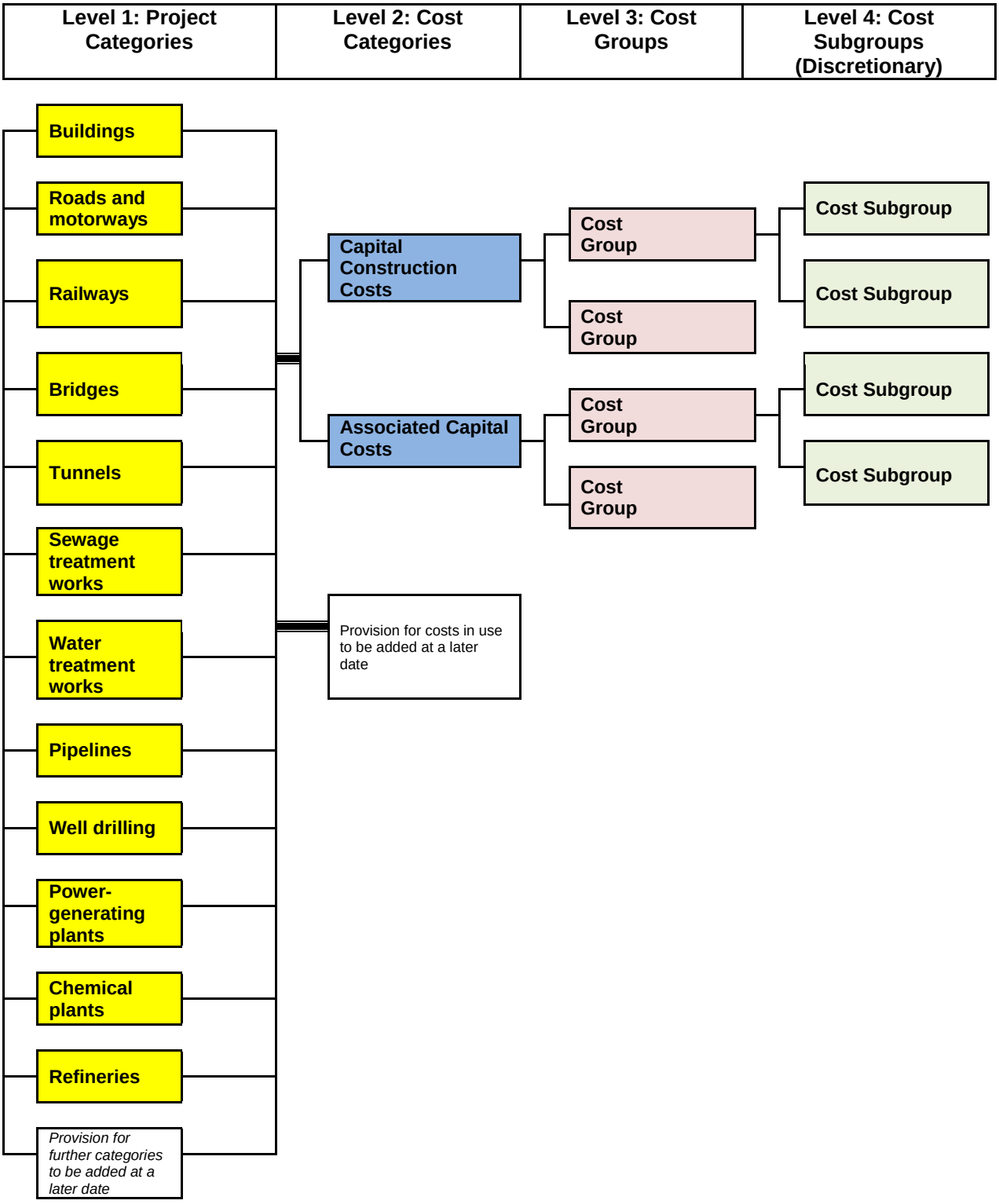
Process flow charts to clarify the use of the Standard are provided in Appendix D.

Part 2 ICMS Framework

2.1 Introduction

Conceptually, the overall framework of **ICMS** is as shown in Figure 1.

Figure 1: ICMS Framework



2.2 Hierarchical Levels

The description of each level in Figure 1 is as follows:

Project Categories (Level 1)

ICMS classifies projects by their types into **Project Categories** at Level 1. These categories describe the essence and principal purpose of the **Project**. The **Project Categories** shown in the framework are not exhaustive and will be the subject of further development in the future editions of the Standard.

Cost Categories and Cost Groups (Levels 2 and 3)

The **Cost Categories** at Level 2 and **Cost Groups** at Level 3, as defined in Table 1, are mandatory and standardised for all **Project Categories** to enable high-level comparison between different projects.

Table 1: Definitions of Cost Categories (Level 2) and Cost Groups (Level 3)
Accepted alternative terms are separated with a vertical slash (|).

	Item	Description
		Cost Categories (Level 2)
		Cost Groups (Level 3)
	0	**Total Capital Cost (1 + 2)**
	1	**Capital Construction Costs**
	1.1	Demolition and site preparation • Scope: All necessary advance or facilitating work to prepare and secure the site prior to starting permanent work, excluding site formation for buildings (which should be included in external and ancillary works)**.**
	1.2	Substructure • Scope: All the load-bearing work underground or underwater up to and including the following, including related earthwork and lateral support beyond site formation: ○ for buildings: lowest floor slabs, and basement sides and bottom including related waterproofing and insulation ○ for roads and motorways: sub-base to pavements ○ for railways: sub-base to rail track structures ○ for bridges: pile caps, footings, bases up to ground level or water level if constructed in water ○ for tunnels: external faces of structural tunnel linings ○ for tanks and the like underground: external faces of tanks ○ for tanks and the like above ground: bases supporting tanks ○ for pipelines underground: beds and surrounds to underground pipes ○ for pipelines above ground: bases to structures supporting pipes ○ for well drilling: bases to structures supporting well heads.
	1.3	Structure • Scope: All the load-bearing work of a **Project Category** excluding those in the Substructure.
	1.4	Architectural works | Non-structural works • Scope: All architectural and non-load-bearing work excluding services, equipment and underground drainage.

	Item	Description
	1.5	Services and equipment • Scope: All fixed power-operated services and equipment required to put the completed project into use, whether they are mechanical, hydraulic, plumbing, drainage, fire-fighting, transport, communication, security, electrical or electronic.
	1.6	Underground drainage • Scope: All surface water or underground drainage specifically serving the buildings or assets.
	1.7	External and ancillary works • Scope: All work outside the external face of buildings or beyond the construction that is fulfilling the primary function of the assets, and not reported as a separate **Project Category.**
	1.8	Preliminaries | **Constructor's** site overheads • Scope: **Constructor's** site management, temporary site facilities, site services, and expenses, not directly related to a particular **Cost Group**, but commonly required to be shared by all **Cost Groups**.
	1.9	**Risk Allowance** • Scope: Allowances for factors that are indeterminate and have not been included in the other **Cost Groups** in this **Cost Category**.
	1.10	**Taxes and Levies**
	2	**Associated Capital Costs**
	2.1	Site acquisition • Scope: All payments required to acquire the site, excluding physical construction.
	2.2	Construction-related consultants and supervision • Scope: Fees and charges payable to **Service Providers** not engaged by the **Constructors.**
	2.3	Work and utilities outside site • Scope: All payments to government authorities or public utility companies to connect public work and utilities to the site, or services diversions, to enable the **Project.**
	2.4	Loose furniture, fittings and equipment • Scope: Provided for the building or asset to perform its function close to or after completion.
	2.5	Administrative, finance, legal and marketing expenses • Scope: All other expenses that may be incurred to support or enable the **Project.**
	2.6	**Risk Allowances** • Scope: Allowances for factors that are indeterminate and have not been included in the other **Cost Groups** in this **Cost Category**.

Cost Subgroups (Level 4)

The costs of components of a **Project** under each **Cost Group** serving a specific function or common purpose are grouped into one **Cost Subgroup** such that the cost of alternatives serving the same function can be compared, evaluated and selected. **Cost Subgroups** are chosen irrespective of their design, specification, materials or construction.

This Standard does not mandate the classification of the **Cost Subgroups**, but the following appendices provide recommended best practices:

- Appendix A: Level 4 **Cost Subgroups**: Buildings
- Appendix B: Level 4 **Cost Subgroups**: Civil Engineering
- Appendix C: Level 4 **Cost Subgroups**: **Associated Capital Costs**.

Users of this Standard may adopt a classification based on trades, work breakdown structure or work results according to their local practice.

2.3 Project Attributes and Project Values

To enable consistent and concise evaluation and comparison between different **Projects** or different design schemes, this Standard provides a set of **Project Attributes** and **Project Values** in Schedule 1 for each of the **Project Categories.** They describe the principal characteristics of the **Project.**

When foreign currency conversion has already been done for presenting using this Standard, the exchange rate(s) used should be stated. When using a cost report at a different point in time, or in a different currency, due consideration should be given to the effects of the changes in the price levels and the foreign currency exchange rates using an appropriate method (see Appendix G Bibliography).

2.4 Projects with multiple Project Categories

Where a **Project** consists of two or more **Project Categories,** or two or more of the same **Project Category** but with differing **Project Values**, each **Project Category** should be reported separately before summing up to show the **Total Project Cost**.

If the cost of a **Project Category** is not significant, it may be included under a more cost significant **Project Category**.

Schedule 1 Project Attributes and Project Values for Each Project Category

Notes:
1. All values should be given so long as the attributes are relevant.
2. Alternative values are separated with a vertical slash (|).
3. Bullet points indicate additional values.
4. All quantities should be rounded to the nearest whole number unless considered inappropriate on special occasions.
5. These **Project Attributes** and **Project Values** capture the minimum principal cost-significant characteristics of a **Project**. Users may add more **Project Attributes** and **Project Values** to suit their needs.

Project Attributes	Project Values
Common (for all **Project Categories**)	
Report	
Project title	Title of the Project.
Status of cost report	Pre-construction forecast | mixture of actual and forecast during construction | actual costs after construction.
Date of cost report	Month and year | revision number.
Brief description of the Project	• Client's name • function capturing the most cost-significant Project Category • scope.
Location and country	International Organisation for Standardisation (ISO) country code (e.g. CN) | address of building site(s) | start and end locations for linear civil engineering works.
Project categories included	Buildings | roads and motorways | railways |bridges | tunnels | sewage treatment works | water treatment works | pipelines | well drilling | power-generating plants | chemical plants | refineries | others stated.
Price Level	
Currency	ISO currency code (e.g. USD).
Exchange rates	Rate used to convert from actual cost | payment currencies to the reported currency at the cost base date.
Cost base date	Month and year.
Programme	
Project status	Concept and initiation phase | design phase | construction and commissioning phase | complete.
Construction period	• Number of months • from demolition and site preparation | others stated • to: completion of commissioning | others stated.
Site	
Existing site status	• Greenfield | brownfield • urban | rural | agricultural.
Site topography	Principally flat | principally hilly | mixed | mountainous | offshore.
Ground conditions	Soft | rocky | reclaimed.
Site conditions and constraints	• Access problems: difficult | average | easy • extreme climatic conditions: difficult | average | easy • environmental constraints: difficult | average | easy.
Procurement	
Funding	Private | public | public and private in partnership.
Project delivery	• Lump sum stipulated price | re-measurement | cost reimbursement | others stated • design bid build | design and build (turnkey) | build operate and transfer | public private partnership | management contracting | construction management | engineer procure construct | others stated.

Project Attributes	Project Values
Buildings (A construction with a cover and enclosure to house people, equipment or goods for persistent daily use)	
Code	
UN ISIC code	F4100
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Residential | office | commercial | shopping centre | industrial | hotel | car park | warehouse | educational | hospital | airport terminal | railway station | ferry terminal | mixed | others stated.
Nature	New build | refurbishment, renovation, retrofit, revitalisation | restoration.
Grade	Ordinary quality | medium quality | high quality. (The qualitative description must be read in conjunction with the location.)
Environmental grade	Grade of environmental certification.
Principal design features	• Structural (predominant): timber | concrete | steel | load-bearing masonry | others stated • external walls (predominant): stone | brick/block | render/block | curtain walling | others stated • environmental control: non-air conditioned | air conditioning.
Project Complexity	• Shape (on plan): circular, elliptical or similar | square, rectangular, or similar | complex • design: simple | bespoke | innovative • method of working: sectional completion | out-of-hours working | confined working | others stated.
Design life	Years
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall length × width × height of each building to main roof level (m | ft).
Storey heights (floor level to floor level)	• Typical storey height (m | ft) • other storey heights (m | ft), applicable floors stated.
Storey above ground (qualitative)	House | low rise | medium rise | high rise. (The qualitative description must be read in conjunction with the location.)
Storey above ground (quantitative)	Specific number | 0–3 | 4–7 | 8–20 | 20–30 | 30–50 | over 50.
Storey below ground	Specific number.
Project Quantities	
Site area	Site area within lot boundary of building site, excluding temporary working areas outside the site (m^2 | ft^2).
Projected footprint area	m^2 | ft^2
Gross external floor area as **IPMS** 1	m^2 | ft^2
Gross internal floor area as **IPMS** 2	m^2 | ft^2
Functional units	Occupancy | number of bedrooms | number of hospital beds | number of hotel rooms | number of car parking spaces | number of classrooms | number of students | number of passengers | number of boarding gates | others stated.
Roads and motorways (A pavement providing a thoroughfare, route, or way for vehicular traffic on land between two or more places including but not limited to alley, street, collector and rural roads, county and interstate highways. Elevated roads and motorways as an integral part of bridges shall be included in bridges)	
Code	
UN ISIC code	F4210

Project Attributes	Project Values
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	• Highway | freeway | expressway | road | lane • smooth surface | speed humps • switchbacks | undulating | flat | mixed • straight | winding | mixed.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• At grade | in cutting | in tunnel | on embankment | elevated | mixed • design speed • number of carriageways • number of lanes per carriageway • lane width (m | ft) • hard shoulders | no hard shoulders • footways | no footways • footway width (m | ft) • flexible construction | concrete pavement.
Project Complexity	• Number of grade-separated intersections • number of at-grade intersections • number of crossings over roads, railways, waterways and the like • number of access ramps.
Design life	Years.
Altitude	• Minimum height of passageway above or below sea level • maximum height of passageway above or below sea level (m | ft).
Dimensions	Total width of metalled surface of each road or motorway (m | ft) (including hard shoulders but excluding footways).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length (between two places, irrespective of number of lanes)	km | miles
Functional units	Capacity (vehicles per hour).
Railways (A permanent way, rail track composed of two parallel rails fixed to sleepers, or single monorail that includes spurs, sidings and turnouts for train traffic or the like, including tramways)	
Code	
UN ISIC code	F4210
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Passenger | freight | industrial | mixed.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• At grade | in tunnel | elevated | mixed • design speed • for electric | diesel | others stated | mixed locomotives • number of tracks • track gauge • flexible | rigid construction • fish-plated | welded joints.

Project Attributes	Project Values
Project Complexity	• Number of intersections with roads and other railways • number of crossings over water, roads, other railways, valleys and the like.
Design life	Years.
Altitude	• Minimum height of track bed above or below sea level • maximum height of track bed above or below sea level (m | ft).
Dimensions	Average width of rail corridor between legal boundaries (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length (between two places, irrespective of number of tracks)	km | miles
Functional units	• number of passengers per day • freight (tonnes | tons) per day.
Bridges (A structure designed to span across a physical obstacle)	
Code	
UN ISIC code	F4210
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	For roads | rail | conveyors | pipeline | canal | mixed | others stated.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification
Principal design features	• Arch | post and beam | cantilever | suspension | cable-stayed | other stated • fixed | movable | temporary • natural materials | wood | concrete | steel | advanced materials | mixed.
Crossing type	• River and canal | roads and motorways | railways | others stated.
Project Complexity	• Straight | curved • number of access ramps • number of abutment/piers/towers with foundations in water.
Design life	Years.
Altitude	Average height of deck above or below sea level (m | ft).
Dimensions	• Width (including walkways, hard shoulders and the like) (m | ft) • maximum height above the lowest point land/water (m | ft) • minimum clearance height (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length	Deck length (km | miles).
Functional units	Capacity (vehicles per hour, litres | gallons per hour, tonnes | tons per hour).
Tunnels (An artificial underground or underwater passageway, completely enclosed except for openings for entrance and exit, commonly at each end, and for ventilation)	
Code	
UN ISIC code	F4210
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Road | railway | pipeline | conveyor | mixed.
Nature	New build | maintenance and repair.

Project Attributes	Project Values
Environmental grade	Grade of environmental certification.
Principal design features	• Cut and fill | tunnel-boring machine | drill and blast | immersed mixed • in compressed air | not in compressed air • lined with iron | steel | concrete | not lined • predominantly straight | curved | mixed • underwater | not underwater • ventilated | not ventilated • number of passages separated by a dividing wall.
Project Complexity	• Number of intersections • predominantly flat | undulating • cross sectional shape: circular | oval | rectangular | others stated.
Design life	Years.
Altitude	• Minimum height of passageway above or below sea level • maximum height of passageway above or below sea level (m | ft).
Dimensions	• Overall cross section area of the tunnel (m^2 | ft^2) • overall width (m | ft) • overall height (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length	km | miles.
Functional units	Capacity (vehicles per hour, litres | gallons per hour, tonnes | tons per hour).
Sewage treatment works (A facility for the cleaning and improvement of water that contains waste products, contaminants or pollutants to make it safe for discharge to land or water)	
Code	
UN ISIC code	F4220
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Description of primary, secondary and tertiary treatment processes.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• Plant technology • number of modules • tank materials for each process (steel | concrete | others stated) • fixed | temporary.
Project Complexity	Standard of cleanliness of treated water.
Design life	Years.
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall external diameter | length × width × height of each major structure (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Functional units	Capacity (litres | gallons per day).
Water treatment works (A facility for the cleaning and improvement of water to make it potable)	
Code	
UN ISIC code	F4220
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	

Project Attributes	Project Values
Functional type	Processes involved: screening | pre-ozonation | coagulation | flocculation | clarification | filtration | pH correction | chemical dosing | chlorination | others stated).
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• Plant technology • number of modules • tank materials for each process (steel | concrete | others stated) • fixed | temporary.
Project Complexity	• Number of processes • level of cleanliness of treated water.
Design life	Years.
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall external diameter | length × width × height of each major structure (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Functional units	Capacity (litres | gallons per day).
Pipelines (A series of pipes and tubing for the transfer of liquid or gas)	
Code	
UN ISIC code	F4220
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	For transporting liquid | gas.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• Principal materials • minimum and maximum depths below ground • minimum and maximum heights above ground • cut and cover | directional drilling • insulation type | no insulation • corrosion protection measures.
Project Complexity	• On land | underwater • number of intersections • number of specials • number of crossings over roads, railways, waterways and the like • number of pumping stations, inspection points, pressure relief points.
Design life	Years.
Altitude	• minimum height above or below sea level • maximum height above or below sea level (m | ft).
Dimensions	Number and diameter of each pipe (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length of pipes	Sum of number × each length (km | miles).
Length from servicing inlets to outlets	(km | miles)
Functional units	Capacity (litres | gallons | m^3 | ft^3 per hour)
Well drilling (Process of drilling in the ground for the purpose of extraction of a natural resource or the injection of a fluid or for the evaluation/monitoring of subsurface formations)	
Code	

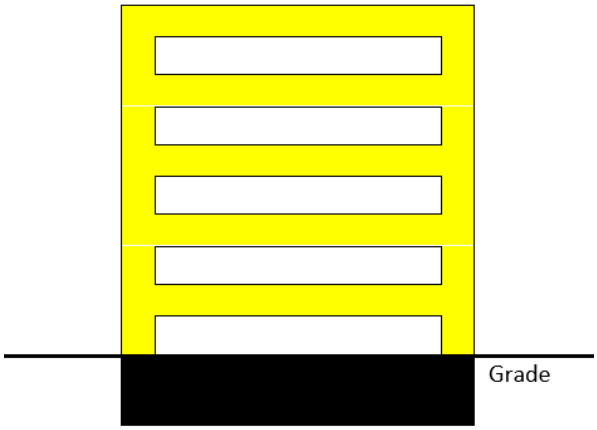
Project Attributes	Project Values
UN ISIC code	F4220
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	• Water | gas | oil | others stated • on shore | off shore.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	Lining material: steel | concrete | others stated.
Project Complexity	Vertical | directional.
Design life	Years.
Altitude	Commencing height above | below sea level (m | ft).
Dimensions	• Number of wellheads • number and diameter of drill hole at each (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Length of drilled depth	• Vertical (m | ft) • Inclined or horizontal (m | ft).
Functional units	Capacity (m^3 | ft^3 | litres | gallons per hour).
Power-generating plants (A facility for the generation of electrical power. Major buildings and civil engineering works shall be reported under separate Project Categories under a power-generating plant project)	
Code	
UN ISIC code	F4290
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Nuclear | wind-power | solar power | hydroelectric | geothermal | biomass | gas | coal | oil | others stated.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• Generator containment material: concrete | steel | mixed | others stated • coolant: water | gas | others stated • open cycle | close cycle • number and size of turbines (MW).
Project Complexity	Cooling system: wind | water | mixed.
Design life	Years
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall external diameter | length × width × height of each major structure (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Functional units	Capacity (MW)
Chemical plants (A facility for the creation of chemical products excluding petro-chemicals. Major buildings and civil engineering works shall be reported under separate Project Categories under a chemical plant project)	
Code	
UN ISIC code	F4290
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Product description.
Nature	New build | maintenance and repair.

Project Attributes	Project Values
Environmental grade	Grade of environmental certification.
Principal design features	• Principal processes: oxidation | reduction | hydrogenation | dehydrogenation | hydrolysis | hydration | dehydration | halogenation | nitrification | sulphonation | ammoniation | alkaline fusion | alkylation | dealkylation | esterification | polymerization | polycondensation | catalysis | others stated. • principal reactor materials: mild steel | stainless steel | concrete | mixed | others stated.
Project Complexity	Number of processes.
Design life	Years.
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall external diameter | length × width × height of each major structure (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Functional units	Output of product per day (m^3 | ft^3 | tonnes | tons | litres | gallons per day).
Refineries (A downstream facility for the creation of petro-chemical products. Major buildings and civil engineering works shall be reported under separate Project Categories under a refinery project. **Well drilling** is upstream and **Pipelines** are midstream)	
Code	
UN ISIC code	F4290
Local functional code (if relevant)	• Name of local classification standard • code number.
Works	
Functional type	Oil | petrol | mixed | others stated.
Nature	New build | maintenance and repair.
Environmental grade	Grade of environmental certification.
Principal design features	• Principal processes: upstream | downstream • principal reactor materials: mild steel | stainless steel | concrete | mixed | others stated.
Project Complexity	• Number of processes • number of products.
Design life	Years.
Altitude	Average height of site above or below sea level (m | ft).
Dimensions	Overall external diameter | width and height of each major structure (m | ft).
Project Quantities	
Site area	Area of land covered by permanent work, excluding temporary working areas outside the site (hectares | acres).
Functional units	• Input of crude oil (tonnes | tons | litres | gallons | barrels per calendar day) • output of product (tonnes | tons | litres | gallons | barrels per calendar day).

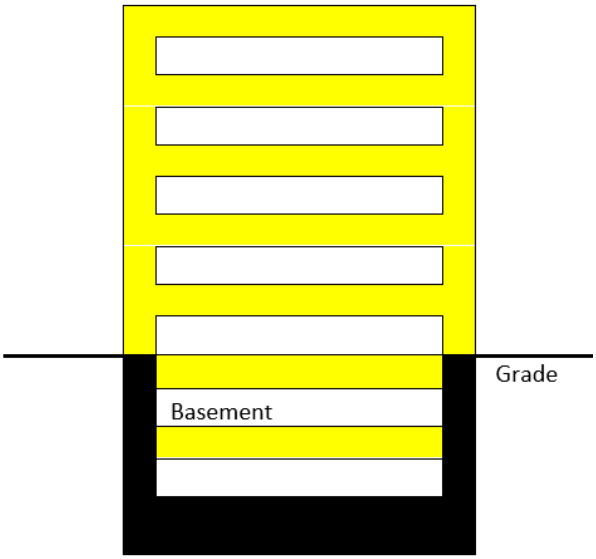
Schedule 2 Substructure and Structure Delineation for Each Project Category

Structure
Substructure

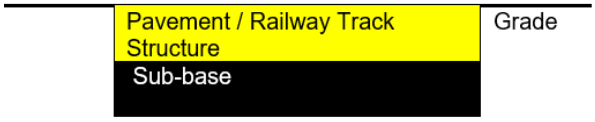
Buildings without basement



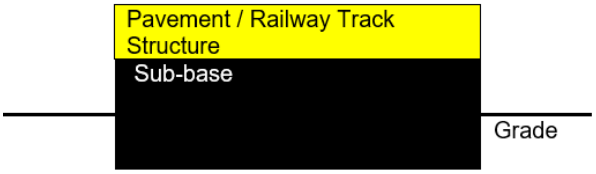
Buildings with basement



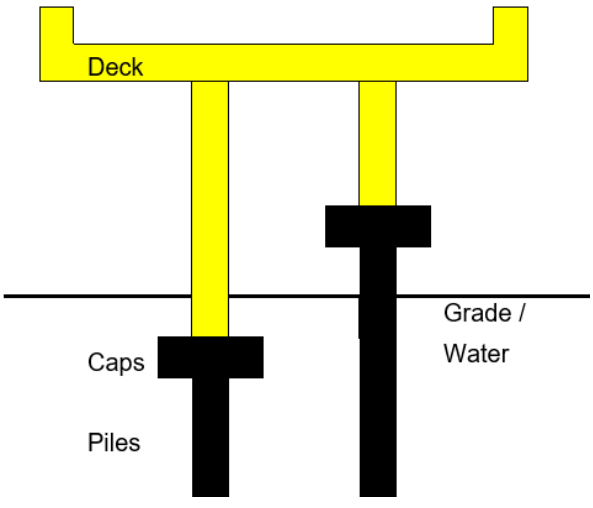
Roads, motorways and rail track structures close to surrounding ground level



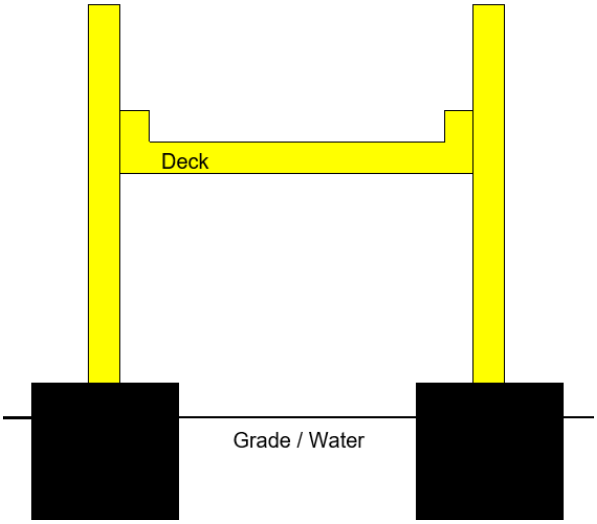
Roads, motorways and rail track structures higher than surrounding ground level



Bridges



Bridges



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 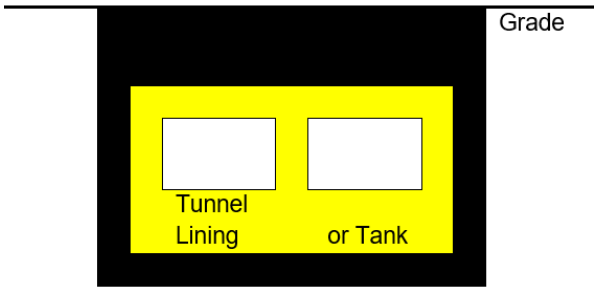
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 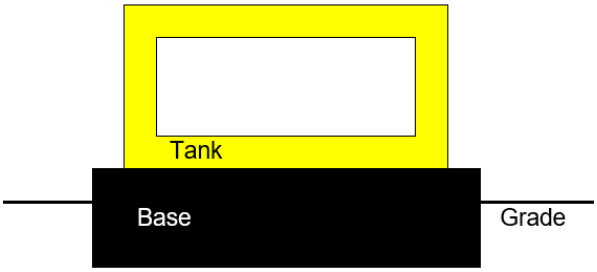
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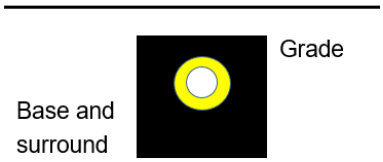
<td>Pipelines underground
 
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<td>Pipelines above ground
 
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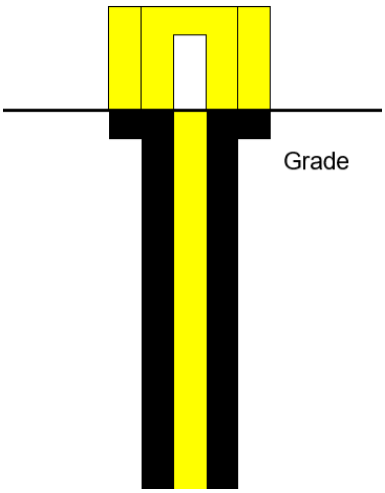
<td>Well drilling
 
</td>
<td>Sewage treatment works, water treatment works, power-generation plants, chemical plants and refineries

Use the same principles as illustrated above.</td>
</tr>
</table>

Appendices

General notes

(a) Accepted alternative terms are separated with a vertical slash (|).

(b) Allocate costs to their most relevant **Project Category, Cost Group** and **Cost Subgroup** as far as possible.

(c) Group costs of ancillary items, such as temporary lateral supports / temporary drainage / dewatering / slope treatment and protection for earthwork, falsework / formwork / reinforcement for concrete work, ironmongery / hardware, fixing accessories, inline fittings for pipes / drains / conduits / cables, painting / coating, etc. with their principal items unless otherwise shown as a **Cost Subgroup**.

(d) Round off costs suitably.

(e) State 'Excluded' or 'N/A' (not applicable) as appropriate to avoid doubt.

(f) Apportion the costs of items 1.08–1.10 into items 1.01–1.07 in case of simplified presentation.

(g) As the **Project** develops, the **Risk Allowance** under item 1.09 may be gradually expended and the expended costs would be reflected in the costs of other items. The allowances may be explicitly shown in the **Constructor's** contract sum build-up or reserved in the **Client's** own budget not known to the **Constructor**. For cost reports on actual costs after construction, any surplus allowances should not be included.

(h) The 'Design development allowance' under item 1.09 is an allowance in a pre-construction forecast estimate or cost plan for unforeseen extra costs due to the development of the design as it evolves. Once the design is complete, this allowance should become zero.

(i) The 'Construction contingencies' under item 1.09 is an allowance for unforeseen extra costs during construction. Typically, it is to cover unforeseen events after awarding a construction contract. After the completion of the final account for the construction contract, this allowance should become zero.

(j) Typically, a pre-construction cost estimate may be prepared based on the price level at a certain date, which may be current at the time of preparing the estimate or at an earlier base date, with or without allowance for the possible increases or decreases due to inflation or deflation during construction. A construction contract may be priced based on the price levels at a certain base date around the time of tendering and permit adjustments for rises or falls in the costs during construction. A provisional allowance should be made inside or outside the contract for the possible increase or decrease, and should gradually be replaced with the actual outcome. The 'Price level adjustments' under item 1.09 are to allow for the aforesaid possible change until the time of tendering, and further change during construction.

Appendix A: Cost Subgroups: Buildings

Item	Description	Note
	Cost Category (Level 2)	
	Cost Group (Level 3)	
	Cost Subgroup (Level 4)	
1	**Capital Construction Costs**	
1.01	Demolition and site preparation	
1.01.010	Site survey and investigation	
1.01.020	Environmental treatment	
1.01.030	Sampling for construction, geophysical, geological or similar purposes	
1.01.040	Temporary fencing	
1.01.050	Demolition of existing buildings and support to adjacent structures	
1.01.060	Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)	
1.01.070	Tree transplant	
1.01.080	Temporary surface drainage and dewatering	
1.01.090	Temporary protection, diversion and relocation of public utilities	
1.02	Substructure	
1.02.010	Foundation piling: - mobilisation and demobilisation - trial piles - permanent piles - pile testing.	
1.02.020	Foundations up to top of lowest floor slabs: - excavation and disposal - lateral supports - raft footings, pile caps, column bases, wall footings, strap beams, tie beams - substructure walls and columns - ground beams and ground slabs - lift pits.	
1.02.030	Basement sides and bottom: - excavation and disposal - lateral supports - bottom slabs and blinding - sides - vertical waterproof tanking, drainage blanket, drains and skin wall - horizontal waterproof tanking, drainage blanket, drains and topping slab - insulation - lift pits, sump pits, sleeves.	
1.03	Structure	
1.03.010	Structural removal and alterations	
1.03.020	Basement suspended floors: - walls and columns - beams and slabs - staircases.	
1.03.030	Frames and slabs: - structural walls and columns - upper floor beams and slabs - roof beams and slabs - staircases - fireproofing to steel structure.	
1.03.040	Tanks, pools, sundries	
1.04	Architectural works | Non-structural works	
1.04.010	Non-structural removal and alterations	
1.04.020	External elevations: - non-structural external walls and features - external wall finishes except cladding	

Item	Description	Note
	- facade cladding and curtain walls - external windows - external doors - external shop fronts - roller shutters and fire shutters.	
1.04.030	Roof finishes, skylights and landscaping (including waterproofing and insulation): - roof finishes - skylights - roof landscaping (hard and soft).	
1.04.040	Internal divisions: - non-structural internal walls and partitions - shop fronts - toilet cubicles - cold rooms - internal doors - internal windows - roller shutters and fire shutters - sundry concrete work.	
1.04.050	Fittings and sundries: - balustrades, railings and handrails - staircases and catwalk not forming part of the structure, cat ladders - cabinets, cupboards, shelves, counters, benches, notice boards, blackboards - exit signs, directory signs - pelmets and curtains - decorative features - interior landscaping - access panels, fire service cabinets - sundries.	
1.04.060	Finishes under cover: - floor finishes (internal and external) - internal wall finishes and cladding - ceiling finishes and false ceilings (internal or external).	
1.04.070	Builder's work in connection with services: - plinth, bases - fire-proofing enclosure - hoisting beams, lift pit separation screens - suspended manholes - cable trenches, trench covers - sleeves, openings and the like not allowed for in Fittings and sundries.	
1.05	Services and equipment	
1.05.010	Heating, ventilating and air-conditioning systems/air conditioners: - seawater system - cooling water system - chilled water system - heating water system - steam and condensate system - fuel oil system - water treatment - air handling and distribution system - condensate drain system - unitary air-conditioning system - mechanical ventilation system - kitchen ventilation system - fume-extraction system - anaesthetic gas-extraction system - window and split-type air conditioners - air-curtains - fans - related electrical and control systems.	

Item	Description	Note
1.05.020	Electrical services: - high-voltage transformers and switchboards - incoming mains, low-voltage transformers and switchboards - main and submain - standby system - lighting and power - uninterrupted power supply - electric underfloor heating - local electrical heating units - earthing/lightning protection and bonding.	
1.05.030	Fitting out lighting fittings	
1.05.040	Extra low voltage electrical services: - communications - staff paging/location - public address system - building automation - security and alarm - close circuit television - communal aerial broadcast distribution and the like.	
1.05.050	Water supply and above ground drainage: - cold water supply - hot water supply - flushing water supply - grey water supply - cleansing water supply - irrigation water supply - rainwater disposal - soil and waste disposal - planter drainage disposal - kitchen drainage disposal - related electrical and control systems.	
1.05.050	Supply of sanitary fittings	
1.05.060	Disposal systems: - refuse - laboratory waste - industrial waste - incinerator.	
1.05.070	Fire services: - fire hydrant and hose reel system - wet risers - sprinkler system - deluge system - gaseous extinguishing system - foam extinguishing system - audio/visual advisory system - automatic fire alarm and detection system - portable hand-operated appliances - related electrical and control systems.	
1.05.080	Gas services: - coal gas - natural gas - liquid petroleum gas - medical gas/laboratory gas - industrial gas/compressed air/instrument air - vacuum - steam.	
1.05.090	Movement systems: - lifts - escalators	

Item	Description	Note
	- conveyors.	
1.05.100	Gondolas	
1.05.110	Turntables	
1.05.120	Generators and uninterruptible power supply	
1.05.130	Energy-saving features	
1.05.140	Sewage treatment	
1.05.150	Fountains, pools and filtration plant	
1.05.160	Powered building signage	
1.05.170	Kitchen equipment	
1.05.180	Cold room equipment	
1.05.190	Laboratory equipment	
1.05.200	Medical equipment	
1.05.210	Hotel equipment	
1.05.220	Car park or entrances access control	
1.05.230	Domestic appliances	
1.05.240	Other specialist services	
1.05.250	Builder's profit and attendance on services	
1.06	Underground drainage	
1.06.010	Surface water drainage	
1.06.020	Storm water drainage	
1.06.030	Foul water drainage	
1.06.040	Drainage connections	
1.06.050	CCTV inspection of existing or new drains	
1.07	External and ancillary works	
1.07.010	Site formation, slope treatment and incidental temporary drainage and dewatering further to site preparation	
1.07.020	Permanent retaining structures	
1.07.030	Site enclosures and divisions	
1.07.040	Ancillary structures	
1.07.050	Roads and paving	
1.07.060	Landscaping (hard and soft)	
1.07.070	Fittings and equipment	
1.07.080	External services: - water supply - gas supply - power supply - communications supply - external lighting - utility connections.	
1.08	**Preliminaries | Constructor's site overheads**	(f)
1.08.010	Construction management including site management staff and support labour	
1.08.020	Insurances and bonds	
1.08.030	Common construction plant	
1.08.040	Temporary access roads and storage areas	
1.08.050	Temporary facilities and services	
1.08.060	Submissions and reports	
1.08.070	Building information modelling (BIM)	
1.08.080	Traffic management and diversion	
1.08.090	Safety, health and environmental management	
1.08.100	Monitoring and recording	
1.08.110	Testing and commissioning	
1.08.120	As-built documentation	
1.09	**Risk Allowance**	(f), (g)
1.09.010	Design development allowance	(h)
1.09.020	Construction contingencies	(i)
1.09.030	Price level adjustments:	(j)

Item	Description	Note
	- until tendering - during construction.	
1.09.040	Exchange rate fluctuation adjustments	
1.10	**Taxes and Levies**	(f)
1.10.010	Paid by the Constructor	
1.10.020	Paid by the Client in relation to the construction contract payments	

Appendix B: Cost Subgroups: Civil Engineering Works

Item	Description	Roads and motorways	Railways	Bridges	Tunnels	Sewage treatment works	Water treatment works	Pipelines	Well drilling	Power generating plants	Chemical plants	Refineries	Note
	Cost Category (Level 2)												
	Cost Group (Level 3)												
	Cost Subgroup (Level 4)												
1	**Capital Construction Costs**												
1.01	Demolition and site preparation												
1.01.010	Site survey and investigation	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.020	Environmental treatment	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.030	Sampling for construction, geophysical, geological or similar purposes	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.040	Temporary fencing	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.050	Demolition of existing structures and support to adjacent structures	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.060	Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.070	Tree transplant	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.080	General site formation and slope treatment	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.090	Temporary surface drainage and dewatering	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.100	Temporary access roads and storage areas (provided under an advance contract)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.01.110	Temporary protection, diversion and relocation of public utilities	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.02	Substructure												
1.02.010	Embankments/cuttings	◙	◙	◙	◙								
1.02.020	Excavation, disposal and lateral supports (specifically to receive any substructure construction but excluding general site formation and slope treatment)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.02.030	Trenching	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.02.040	Drilling/boring				◙			◙	◙				

Item	Description	Roads and motorways	Railways	Bridges	Tunnels	Sewage treatment works	Water treatment works	Pipelines	Well drilling	Power generating plants	Chemical plants	Refineries	Note
1.02.050	Piling/anchoring	◙	◙	◙		◙	◙			◙	◙	◙	
1.02.060	Structural backfill/ground remediation	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.02.070	Earth-retaining structures	◙	◙	◙	◙								
1.02.080	Abutments/wing walls	◙	◙	◙									
1.02.090	Pile caps/footings/bases (nearest to the ground level or water level if constructed in water)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.02.100	Sub-base to pavements and rail track structures	◙	◙										
1.02.110	Bases to supports for tanks, pipes, well heads and the like					◙	◙	◙	◙	◙	◙	◙	
1.02.120	Beds and surrounds to underground pipes					◙	◙	◙	◙	◙	◙	◙	
1.02.130	Bearings			◙									
1.03	Structure												
1.03.010	Piers and towers			◙									
1.03.020	Suspension system			◙									
1.03.030	Decks			◙									
1.03.040	Tunnel lining				◙								
1.03.050	Road/track base	◙	◙	◙	◙								
1.03.060	Pavement	◙	◙	◙	◙								
1.03.070	Service roads and approaches	◙	◙	◙	◙								
1.03.080	Parapets/edge treatment	◙	◙	◙	◙								
1.03.090	Main structures					◙	◙	◙	◙	◙	◙	◙	
1.03.100	Tanks, rigs, storage containers and the like					◙	◙	◙	◙	◙	◙	◙	
1.03.110	Supports for tanks, pipes and the like					◙	◙	◙	◙	◙	◙	◙	
1.03.120	Civil pipework					◙	◙	◙	◙		◙	◙	
1.03.130	Valves and fittings					◙	◙	◙	◙		◙	◙	
1.04	Non-structural works												
1.04.010	Non-structural removal and alterations	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.04.020	Non-structural construction					◙	◙	◙	◙	◙	◙	◙	
1.04.030	Running surface	◙	◙	◙	◙								
1.04.040	Signage, markings and the like	◙	◙	◙	◙								
1.04.050	Gantries and the like	◙	◙	◙	◙								
1.04.060	Safety facilities	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.04.070	Barriers/rails and means of access	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	

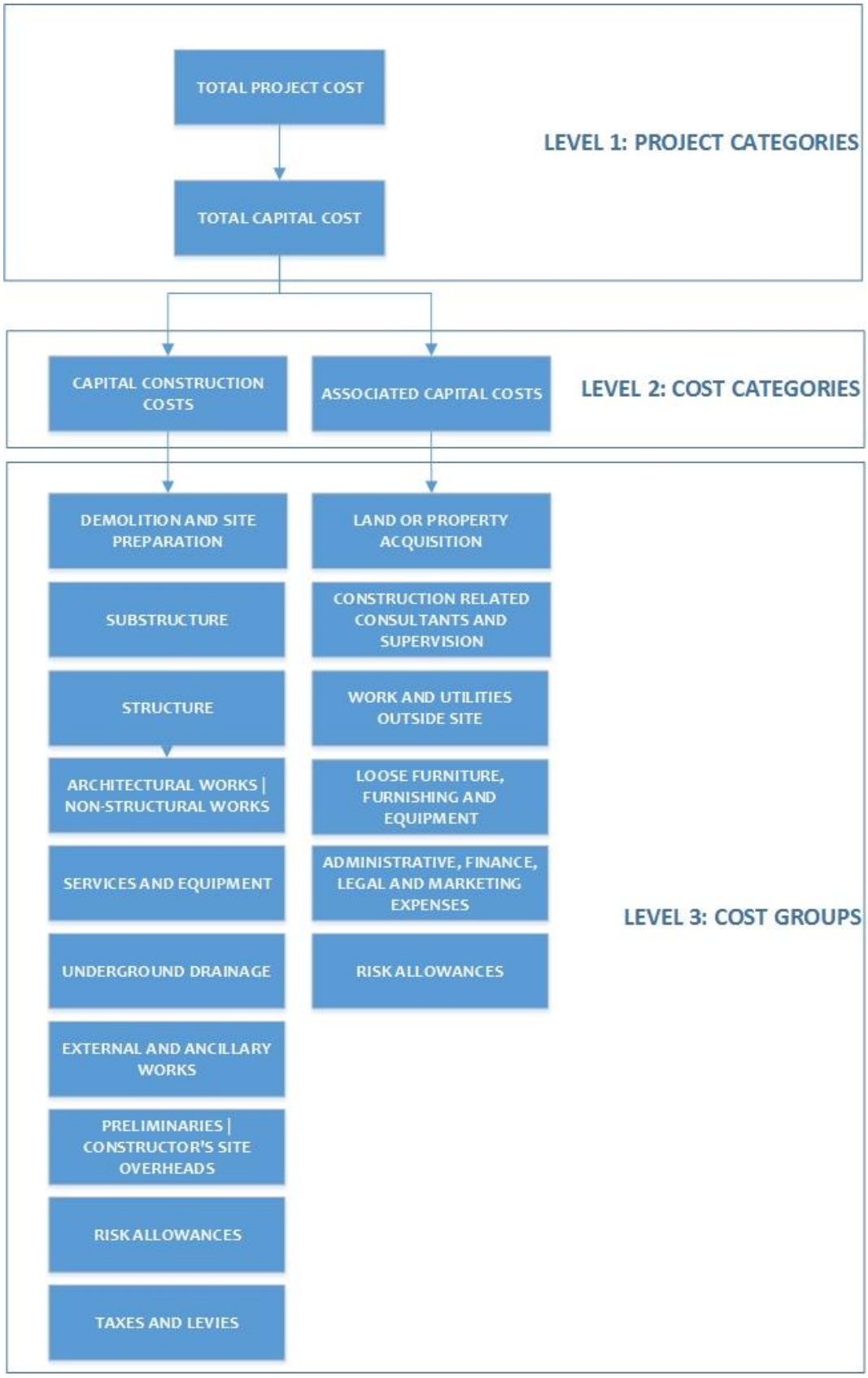
Item	Description	Roads and motorways	Railways	Bridges	Tunnels	Sewage treatment works	Water treatment works	Pipelines	Well drilling	Power generating plants	Chemical plants	Refineries	Note
1.04.080	Special equipment and fittings	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.04.090	Landscaping	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.04.100	Builder's work in connection with services	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05	Services and equipment												
1.05.010	Mechanical systems	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.020	Lighting systems	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.030	Illuminations	◙	◙	◙	◙								
1.05.040	Low-voltage power supply	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.050	High-voltage power supply	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.060	Cables/cable trays	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.070	Other electrical services	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.080	Control systems and instrumentation	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.090	Pipe racks/supports	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.05.100	Water supply and above ground drainage	◙	◙	◙	◙	◙	◙			◙	◙	◙	
1.05.110	Fire services	◙	◙	◙	◙	◙	◙			◙	◙	◙	
1.05.120	Movement systems: lifts/elevators/conveyors	◙	◙	◙	◙	◙	◙			◙	◙	◙	
1.06	Underground drainage												
1.06.010	Surface water drainage	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.06.020	Storm water drainage	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.06.030	Foul water drainage	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.06.040	Pumping systems	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.06.050	Drainage connections	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.07	External and ancillary works												
1.07.010	Site enclosures and divisions	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.07.020	Ancillary structures	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.07.030	Roads and paving (not amounting to a Project Category)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.07.040	Landscaping (hard and soft)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.07.050	Fittings and equipment	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08	Preliminaries | Constructor's site overheads												(f)
1.08.010	Construction management including site management staff and support labour	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.020	Insurances and bonds	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.030	Common construction plant	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	

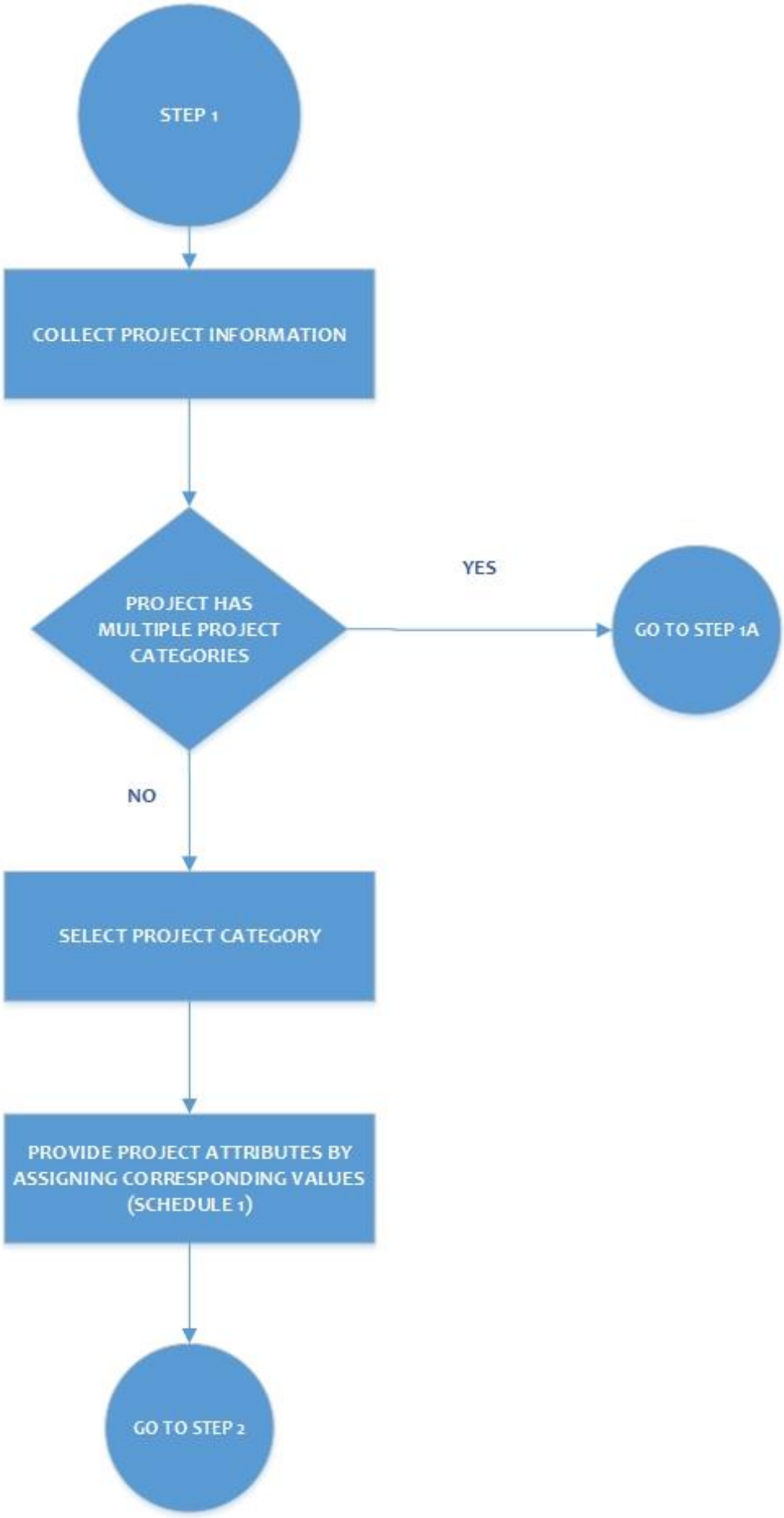
Item	Description	Roads and motorways	Railways	Bridges	Tunnels	Sewage treatment works	Water treatment works	Pipelines	Well drilling	Power generating plants	Chemical plants	Refineries	Note
1.08.040	Temporary access roads and storage areas (at the Constructors' discretion)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.050	Temporary facilities and services	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.060	Submissions and reports	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.070	Building information modelling (BIM)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.080	Traffic management and diversion	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.090	Safety, health and environmental management	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.100	Monitoring and recording	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.110	Testing and commissioning	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.08.120	As-built documentation	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.09	**Risk Allowance**												(f), (g)
1.09.010	Design development allowance	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	(h)
1.09.020	Construction contingencies	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	(i)
1.09.030	Price level adjustments - until tendering - during construction	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	(j)
1.09.040	Exchange rate fluctuation adjustments	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.10	**Taxes and Levies**												(f)
1.10.010	Paid by the Constructors	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	
1.10.020	Paid by the Client in relation to the construction contract payments	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	

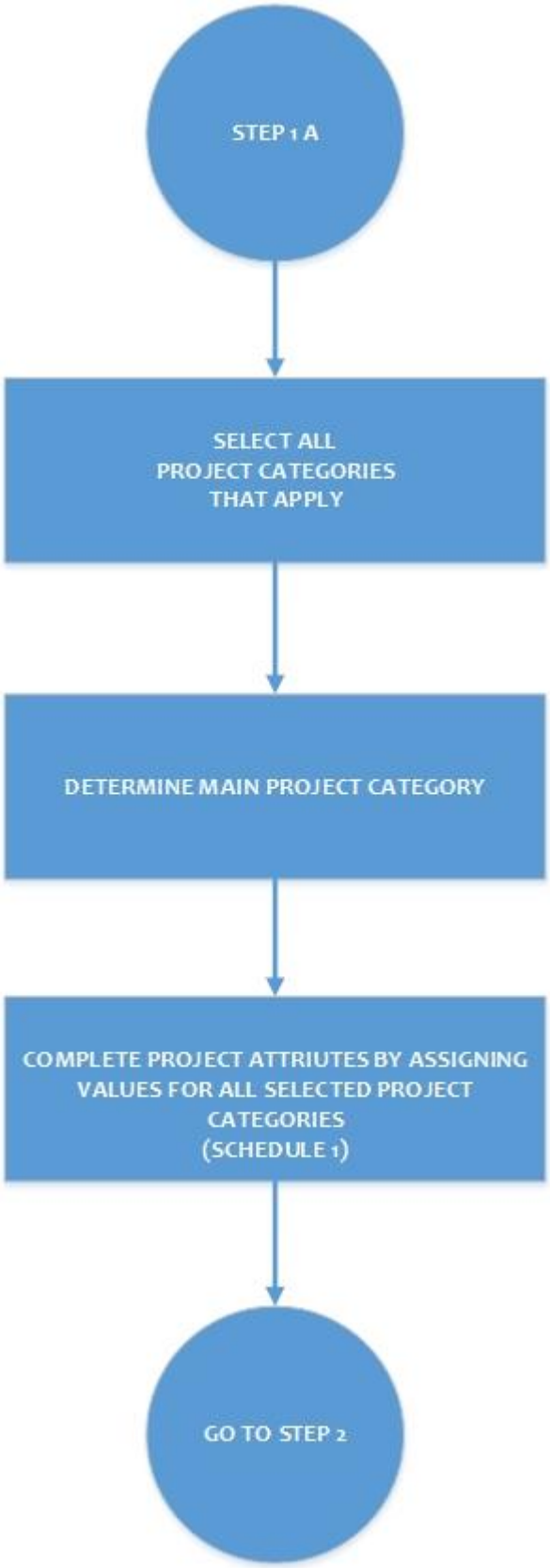
Appendix C: Cost Subgroups: Associated Capital Costs

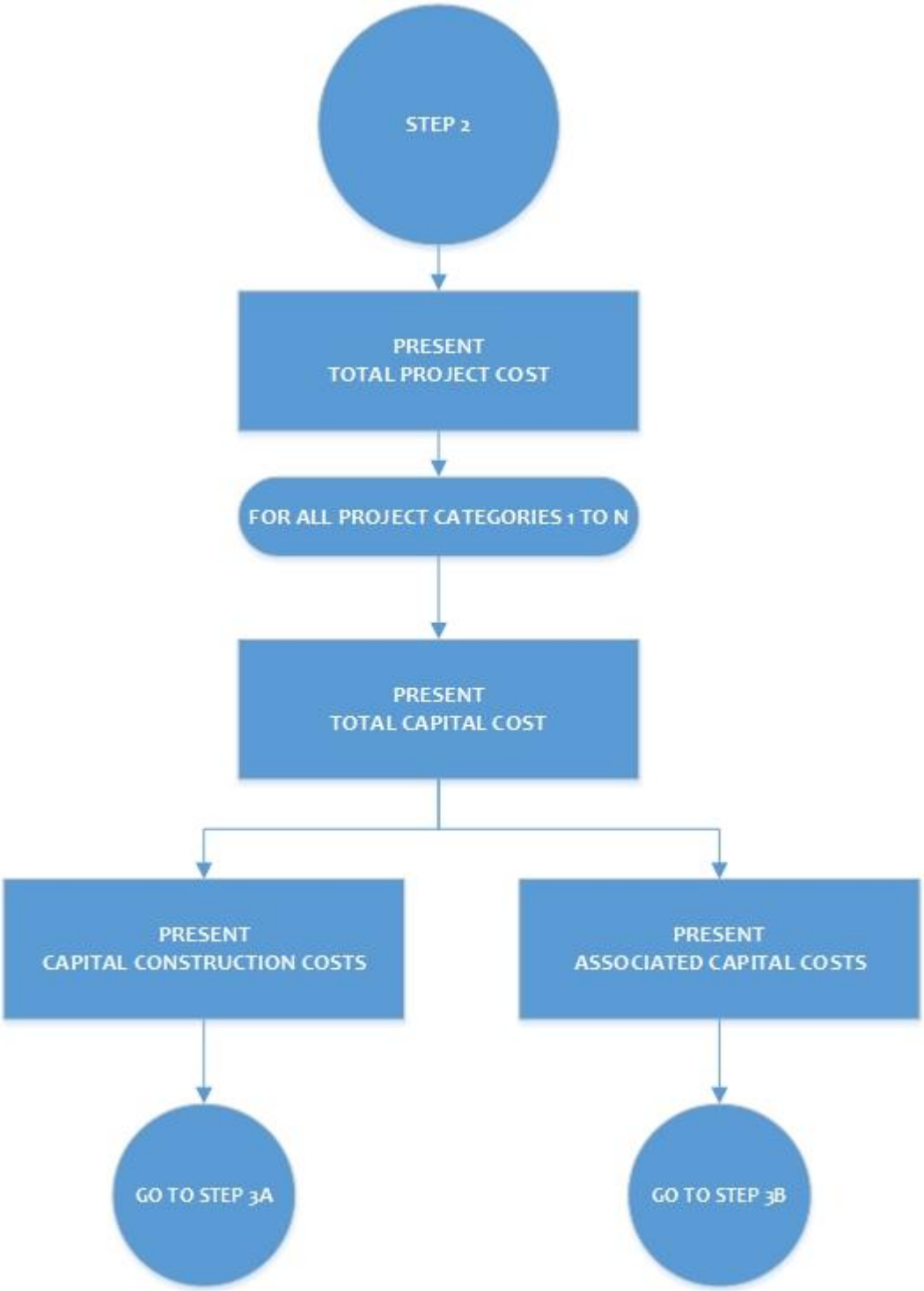
Item	Description
	Cost Category (Level 2)
	Cost Group (Level 3)
	Cost Subgroup (Level 4)
2	**Associated Capital Costs**
2.01	Site acquisition
2.01.010	Costs and premium required to procure site including additional cost and premium to be paid by foreign investors
2.01.020	Compensation to existing occupiers
2.01.030	Demolition, removal and modification of existing properties by way of payment to existing owners instead of carrying out physical work
2.01.040	Related fees to agents, lawyers, and the like
2.01.050	Related taxes and statutory charges
2.02	Construction-related consultants and supervision
2.02.010	Consultants' fees and reimbursable: - architects (architectural, landscape, interior design, technical) - engineers (geotechnical, civil, structural, mechanical, electrical and plumbing, technical) - project managers - surveyors (quantity surveying, land surveying, building surveying, cost engineering) - specialist consultants (environmental, traffic, acoustic, facade, BIM) - value management studies.
2.02.020	Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections)
2.02.030	Site supervision charges (including their accommodation and travels)
2.02.040	Payments to testing authorities or laboratories
2.03	Work and utilities outside site
2.03.010	Connections to, diversion of and capacity enhancement of public utility mains or sources outside site up to mains connections on site: - electricity - transformers - water - sewer - gas - telecommunications.
2.03.020	Public access roads and footpaths
2.04	Loose furniture, fittings and equipment
2.04.010	Production, process and loose furniture, furnishing and equipment not normally provided before completion of construction
2.05	Administrative, finance, legal and marketing expenses
2.05.010	Client’s general office overheads
2.05.020	Client's project-specific administrative expenses: - in-house project management team - supporting project staff - project office venue, furniture and equipment if not included in Constructor’s preliminaries | site overheads - stores and workshops - safety and insurances - staff training - accommodation and travelling expenses for in-house team and external parties.
2.05.030	Interest and finance costs
2.05.040	Legal expenses
2.05.050	Accounting expenses
2.05.060	Sales, leasing, marketing, advertising and promotional expenses
2.05.070	Taxes and statutory charges related to sales and lease
2.05.080	Licence and permit charges for operation and use
2.06	**Risk Allowance**

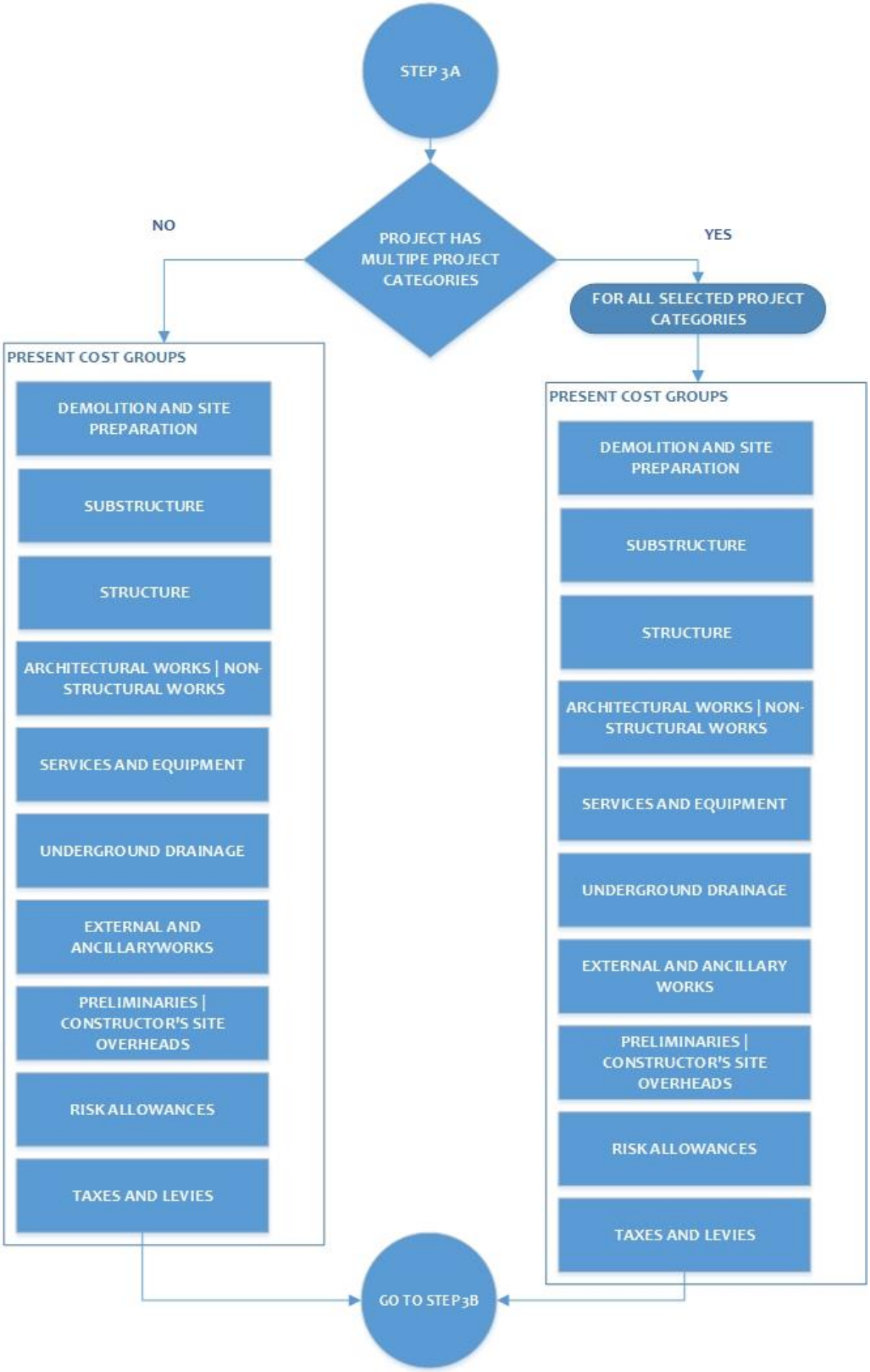
Appendix D: Process Flow Charts

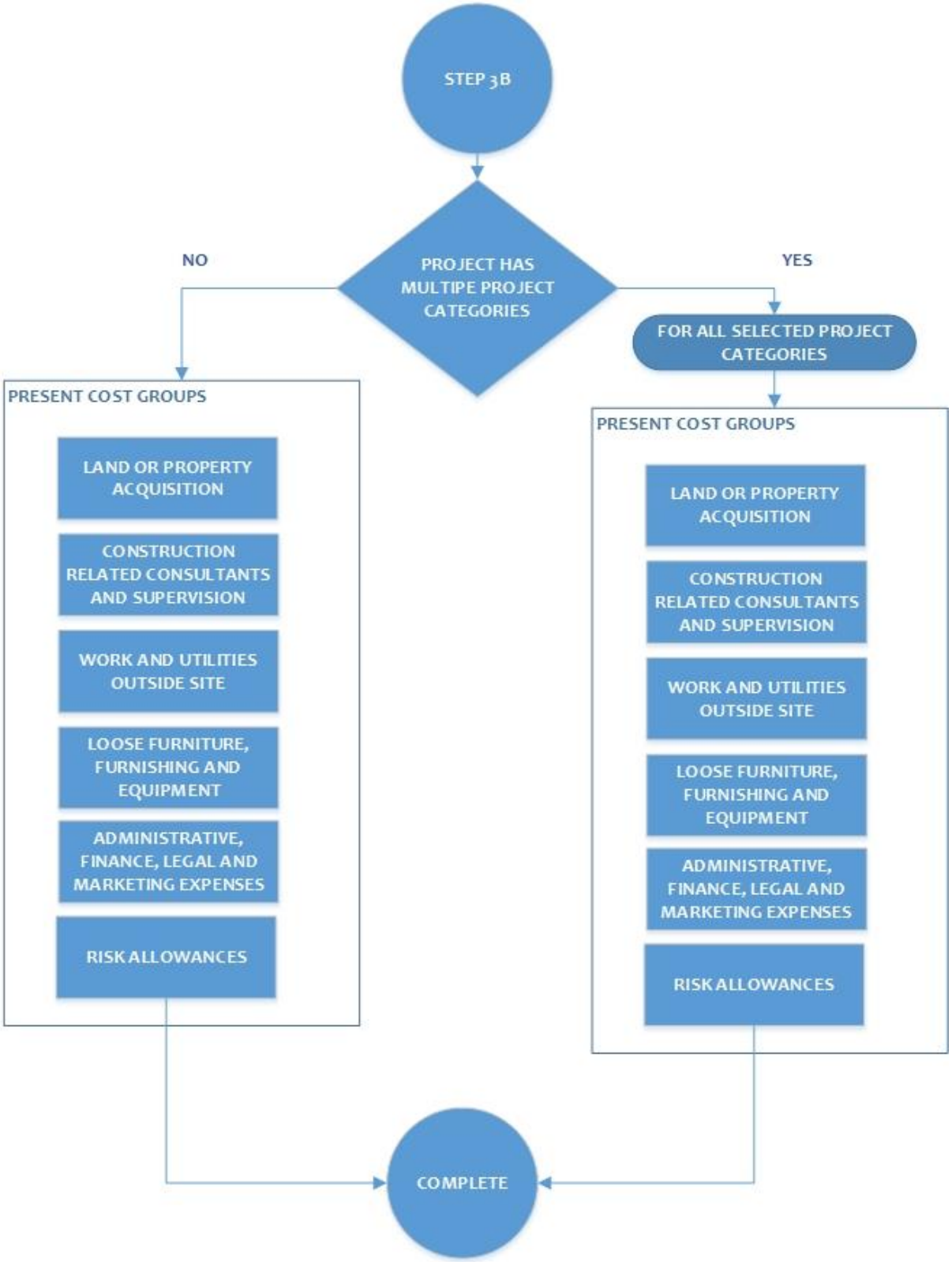



STEP 1
COLLECT PROJECT INFORMATION
PROJECT HAS MULTIPLE PROJECT CATEGORIES
YES
GO TO STEP 1A
NO
SELECT PROJECT CATEGORY
PROVIDE PROJECT ATTRIBUTES BY ASSIGNING CORRESPONDING VALUES (SCHEDULE 1)
GO TO STEP 2


STEP 1 A
SELECT ALL PROJECT CATEGORIES THAT APPLY
DETERMINE MAIN PROJECT CATEGORY
COMPLETE PROJECT ATTRIUTES BY ASSIGNING VALUES FOR ALL SELECTED PROJECT CATEGORIES (SCHEDULE 1)
GO TO STEP 2


STEP 2
PRESENT
TOTAL PROJECT COST
FOR ALL PROJECT CATEGORIES 1 TO N
PRESENT
TOTAL CAPITAL COST
PRESENT
CAPITAL CONSTRUCTION COSTS
PRESENT
ASSOCIATED CAPITAL COSTS
GO TO STEP 3A
GO TO STEP 3B


STEP 3A
PROJECT HAS MULTIPE PROJECT CATEGORIES
NO
YES
FOR ALL SELECTED PROJECT CATEGORIES
PRESENT COST GROUPS
DEMOLITION AND SITE PREPARATION
SUBSTRUCTURE
STRUCTURE
ARCHITECTURAL WORKS | NON-STRUCTURAL WORKS
SERVICES AND EQUIPMENT
UNDERGROUND DRAINAGE
EXTERNAL AND ANCILLARYWORKS
PRELIMINARIES | CONSTRUCTOR'S SITE OVERHEADS
RISK ALLOWANCES
TAXES AND LEVIES
PRESENT COST GROUPS
DEMOLITION AND SITE PREPARATION
SUBSTRUCTURE
STRUCTURE
ARCHITECTURAL WORKS | NON-STRUCTURAL WORKS
SERVICES AND EQUIPMENT
UNDERGROUND DRAINAGE
EXTERNAL AND ANCILLARY WORKS
PRELIMINARIES | CONSTRUCTOR'S SITE OVERHEADS
RISK ALLOWANCES
TAXES AND LEVIES
GO TO STEP3B


STEP 3B
PROJECT HAS MULTIPE PROJECT CATEGORIES
NO
YES
PRESENT COST GROUPS
LAND OR PROPERTY ACQUISITION
CONSTRUCTION RELATED CONSULTANTS AND SUPERVISION
WORK AND UTILITIES OUTSIDE SITE
LOOSE FURNITURE, FURNISHING AND EQUIPMENT
ADMINISTRATIVE, FINANCE, LEGAL AND MARKETING EXPENSES
RISK ALLOWANCES
FOR ALL SELECTED PROJECT CATEGORIES
PRESENT COST GROUPS
LAND OR PROPERTY ACQUISITION
CONSTRUCTION RELATED CONSULTANTS AND SUPERVISION
WORK AND UTILITIES OUTSIDE SITE
LOOSE FURNITURE, FURNISHING AND EQUIPMENT
ADMINISTRATIVE, FINANCE, LEGAL AND MARKETING EXPENSES
RISK ALLOWANCES
COMPLETE

Appendix E: Reporting Templates

Specific notes

- **Project Attributes** and **Project Values** are not shown in this example, but should be provided in the actual cost report.
- '$M' = $ Million.

Building project

- Additional columns for unit cost per other **Project Quantity** may be added as needed.

Item	Description	Buildings			
		$M	$/m^2	$/m^2	% of '0'
	Project Quantity				
			IPMS 1 Floor Area (m^2)	IPMS 2 Floor Area (m^2)	
0	**Total Capital Cost ('1' + '2')**				
1	**Capital Construction Costs**				
1.01	Demolition and site preparation				
1.02	Substructure				
1.03	Structure				
1.04	Architectural works | non-structural works				
1.05	Services and equipment				
1.06	Underground drainage				
1.07	External and ancillary works				
1.08	Preliminaries | Constructor's site overheads				
1.09	Risk allowances				
1.10	Taxes and Levies				
2	**Associated Capital Costs**				
2.01	Site acquisition				
2.02	Construction-related consultants and supervision				
2.03	Work and utilities outside site				
2.04	Post-completion furniture, furnishing and equipment				
2.05	Administrative, finance, legal and marketing expenses				
2.06	Risk Allowance				

Comparison between two design schemes

Additional columns may be added as appropriate.

Item	Description	Scheme A			Scheme B			B – A			
		$M	$/m^2	$/m^2	$M	$/m^2	$/m^2	$M	$/m^2	$/m^2	% of '0'
	Project Quantity										
			IPMS 1 Floor Area (m^2)	IPMS 2 Floor Area (m^2)		IPMS 1 Floor Area (m^2)	IPMS 2 Floor Area (m^2)		IPMS 1 Floor Area (m^2)	IPMS 2 Floor Area (m^2)	
0	**Total Capital Cost ('1' + '2')**										
1	**Capital Construction Costs**										
1.01	Demolition and site preparation										
1.02	Substructure										
1.03	Structure										
1.04	Architectural works | non-structural works										
1.05	Services and equipment										
1.06	Underground drainage										
1.07	External and ancillary works										

Item	Description	Scheme A			Scheme B			B – A			
		$M	$/m²	$/m²	$M	$/m²	$/m²	$M	$/m²	$/m²	% of '0'
1.08	Preliminaries | Constructor's site overheads										
1.09	Risk Allowances										
1.10	Taxes and Levies										
2	**Associated Capital Costs**										
2.01	Site acquisition										
2.02	Construction-related consultants and supervision										
2.03	Work and utilities outside site										
2.04	Post-completion furniture, furnishing and equipment										
2.05	Administrative, finance, legal and marketing expenses										
2.06	Risk Allowance										

Multi-category Project

Additional columns for other **Project Categories** may be added as appropriate.

When there are costs common to all or most **Project Categories**, and the ways that they should be allocated amongst those **Project Categories** may vary depending on different needs, then a set of columns for 'Common' may be added before the 'Total' to show that those costs may be allocated in the appropriate way when the specific need arises.

Item	Description	Hotel			Apartment			Roads and motorways		Total	
		$M	$/m²	$/m²	$M	$/m²	$/m²	$M	$/m	$M	% of '0'
	Project Quantity										
			IPMS 1 Floor Area (m²)	IPMS 2 Floor Area (m²)		IPMS 1 Floor Area (m²)	IPMS 2 Floor Area (m²)		Road Length (m)		
0	**Total Capital Cost ('1' + '2')**										
1	**Capital Construction Costs**										
1.01	Demolition and site preparation										
1.02	Substructure										
1.03	Structure										
1.04	Architectural works | non-structural works										
1.05	Services and equipment										
1.06	Underground drainage										
1.07	External and ancillary works										
1.08	Preliminaries | Constructor's site overheads										
1.09	Risk Allowances										
1.10	Taxes and Levies										
2	**Associated Capital Costs**										
2.01	Site acquisition										
2.02	Construction-related consultants and supervision										
2.03	Work and utilities outside site										
2.04	Post-completion furniture, furnishing and equipment										
2.05	Administrative, finance, legal and marketing expenses										
2.06	Risk Allowance										

Appendix F: Interface with International Property Measurement Standards (IPMS)

Measurement of Gross Floor Areas for Buildings for ICMS Cost Reports

The various cost analysis standards worldwide require the measurement of a gross floor area (either external (GEFA) or internal (GIFA)). This permits the representation of overall costs in terms of currency per square metre.

Measurement guidelines and definitions vary considerably between countries. Linking **ICMS** with **IPMS** provides a valuable tool for overcoming these inconsistencies. **ICMS** requires a cost report to include both GEFA (**IPMS** 1) and GIFA (**IPMS** 2) measured in accordance with the rules set out in **IPMS**. **IPMS** are evolving on a building-sector basis (offices, residential, retail and the like) and, although **IPMS** 1 will be consistent for all building types, **IPMS** 2 will therefore vary between different building types. These rules are summarised below, but reference to the specific standard, for the particular building type, is recommended.

IPMS 1: Gross External Floor Area

Use

IPMS 1 is used for measuring the area of a building including external walls.

Definition

IPMS 1 is the total of the areas of each floor of a building measured to the outer perimeter of external construction features, which may be reported on a component-by-component basis for each floor of a building. The definition is the same for all classes of building.

Inclusions

IPMS 1 includes all areas and walls, 'columns and enclosed walkways or passages between separate Buildings, available for direct or indirect use. Covered void areas such as atria are only included at their lowest floor level' (*IPMS: Office buildings*, 3.2.2).

In the absence of external construction features, for example, an open-sided building or a free-standing canopy, **IPMS** 1 is to be measured to the covered area. The 'area of basement levels is calculated by extending the exterior plane of the perimeter walls at ground level downwards, or by estimation of the wall thickness if the extent of the basement differs from the footprint of the Building' (*IPMS: Office buildings*, 3.1.2).

Measurements included but stated separately.

Balconies, covered galleries, internal catwalks, sheltered areas, internal permanent mezzanines and generally accessible rooftop terraces are included. They are to be measured to the outer face and their areas stated separately.

Exclusions

'Measurement for **IPMS** 1 is not to include the area of:

- open light wells or the upper level voids of an atrium
- open external stairways that are not an integral part of the structure, for example, an open framework fire escape' (*IPMS: Office buildings*, 3.1.2)
- external areas such as external vehicle parking, external catwalks, vehicle circulation and other areas or structures (such as equipment yards, cooling equipment, refuse areas), and patios and decks at ground level.

Measurement for **IPMS** 1 excludes any other ground-level areas or structures beyond the covered area. Such areas may be measured and stated separately.

IPMS 2: Gross Internal Floor Area

Use

IPMS 2 is used for measuring the internal area of a building.

Definition

IPMS 2 is the total area of each floor of a building measured to the internal dominant face (IDF), which may be reported on a component-by-component basis for each floor of a building. For the purposes of ICMS, the definition is the same for all classes of building.

Inclusions

IPMS 2 includes all areas within the IDF, 'including internal walls, columns and enclosed walkways or passages between separate Buildings, available for direct or indirect use. Covered void areas such as atria are only included at their lowest floor level' (*IPMS: Office buildings*, 3.2.2).

Measurements for the following areas are to be stated separately. For the purposes of ICMS they are not included in the Gross Internal Floor Area.

Balconies, internal catwalks, covered galleries, internal loading bays, internal permanent mezzanines, verandas and generally accessible rooftop terraces are included. They are to be measured to the outer face and their areas stated separately.

Exclusions

Measurement for **IPMS** 2 is not to include areas outside the external wall, temporary mezzanines or open light wells and the upper-level voids of an atrium. Such areas may be measured and stated separately.

Appendix G: Bibliography

- Eurostat: http://ec.europa.eu/eurostat
- International Property Measurement Standards: www.ipmsc.org
- International Standard Industrial Classification of all Economic Activities (ISIC Rev,.4): http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27
- Prices and purchasing power parities: www.oecd.org/std/prices-ppp/
- ISO 12006-2: 2015, *Building construction – Organization of information about construction works. Part 2: Framework for classification*
- ISO 3166-2: 2013, *Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code*
- ISO 4217: 2015, *Codes for the representation of currencies*
- ISO 6707-1: 2014, *Buildings and civil engineering works – Vocabulary – Part 1: General terms*
- ISO 15686-5: 2008 *Buildings and constructed assets – Service life planning.*